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THE MIND AND HEART AS PARTNERS

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Abstract

A common cultural belief in technologically advanced societies is that emotion and reason are opposites, with reason superior to emotion. This belief is not supported by recent results in neuroscience and experimental psychology which show instead that emotion and cognition are strongly interconnected and depend on each other. Moreover, the belief is also harmful to society because it contributes indirectly to racism, sexism, homophobia, and the appeal of demagogues. Scientific understanding can help to heal the cultural split between emotion and reason in the service of building a partnership society.

Keywords: emotion; reason; neuroscience; psychology; partnership; compassion

SOME COMMON PHRASES AND SPEECH HABITS

Modern science and technology have clearly increased human welfare over the last few hundred years. In many countries we survive longer than our ancestors and the majority of us have enough to eat. Acknowledging the debt we owe to advanced thinking, most cultures pay at least lip service to the ideal of human rationality.

Yet the ideal of rationality often has the side effect that the emotional, spiritual, and intuitive sides of our nature have been devalued, and the outward expression of these

parts of us has been discouraged. The characteristic speech of American English reflects these emphases. We exhort people to act on reason instead of emotion. And when we hear people outwardly expressing strong feelings, particularly anger, we often tell them to calm down before we listen to the content of what they have to say.

These habits of speech have a pervasive effect on our thinking of which we are usually unaware. Even when we use language metaphorically and don't mean it literally, it structures our unconscious perceptions of what associations are possible (Lakoff & Johnson, 1981). So I will try to deconstruct these cultural speech habits.

What do Americans typically mean when talking about "acting on emotion"? This phrase is used as a putdown to describe someone committing a crime of passion, or falling in love with a partner who is charming but turns out to be abusive. In the political realm, we use "acting on emotion" to describe voters who are swayed to follow a dishonest demagogue. But we admire the person who works hard to provide an income for his or her family. That person is also acting on emotion – the emotion of love for her or his family members! At best, the same person is also acting on an emotional attachment to the work they are engaged in.

So when we use the phrase "acting on emotion" only in the negative sense, we are restricting emotion to its short-term aspects that interfere with reason and planning. Yet neuroscience has shown that emotion is required to integrate values into decision making and motivate people to act (Damasio, 1994). Levine (2021) comments on the dilemma we sometimes feel about acting on emotion or on reason:

> The answer is usually both – we need emotion to feel the importance of doing something and we need reason to carry it out effectively. So the question poses a false choice: asking "should I act on reason or emotion?" makes no more sense than asking "should I drive with my hands or with my feet?" (p. 111).

Now when we tell someone who is emotionally upset to calm down, we are implicitly assuming that their strong emotion is clouding their judgment and keeping them from making sense. That assumption can sometimes be true but at least as often is false. I can remember many times when I or someone close to me was in a rage that was difficult to deal with but at the same time saying things that were perfectly sensible. When an angry person feels like they are not being listened to, they become even angrier. So even if we do ask someone to calm down, it is more effective to also listen to and seriously consider the content of what they are saying.

These two examples of our customary language suggest that rather than trying to be more rational and less emotional in our decision making, we should try to be more rational *and* more emotional. Acting on reason doesn't mean not acting on emotion: it means acting on what will be emotionally satisfying in the long term even if it goes against momentary feelings. In a time of both great vulnerability and great opportunity for our planet, our decisions need to be based on facts and reasoning about the consequences of our actions. At the same time, they need to be based on values that bond us to each other and to the earth.

The urges to think and to feel are both deeply rooted in human evolution (Lawrence & Nohria, 2002; Panksepp, 1998; Perlovsky, 2001, 2006). Nowhere is the need to combine facts and values more urgent than in politics.

POLITICS NEEDS REASON AND PASSION

The privileging of reason over emotion is a legacy of the 17th and 18th century Enlightenment, influenced by Descartes, Locke, and other philosophers of that period (Levine, 2021; Saul, 1992). It was originally progressive in its inspiration, being tied to the growth of science and the decline of superstition. The growth of science, and the

technology that it spawned, was a major factor in the widespread increase in economic prosperity in many countries.

So it is no wonder that the use of reason in politics is widely praised. In the United States, the country where I have lived for all but four months of my life and know the best, political progressives have tended in their campaigns to embrace reasoned arguments based on facts. Yet all too often their campaigns have foundered on being dry: the campaigns lacked emotional appeal and failed to connect with enough of the voters to win elections. This accounts in part for the narrow losses sustained by the presidential campaigns of Al Gore in 2000, John Kerry in 2004, and Hillary Clinton in 2016 – despite the candidates' policy positions being closer to voters' preferences than their opponents' positions. Political psychologist Drew Westen described why this fact-centered approach to campaigning does not work well:

> … Democratic strategists for the last three decades have … clung tenaciously to the dispassionate view of the mind and to the campaign strategy that logically follows from it, namely one that focuses on facts, figures, policy statements, costs, and benefits, and appeals to intellect and expertise.
>
> They do so … because of an *irrational emotional commitment to rationality* (emphasis Westen's) – one that renders them, ironically, impervious to … scientific evidence on how the political mind and brain work … (Westen, 2007, p. 15).

Westen, who has been an advisor to Democratic Party candidates, did not advocate an abandonment of reasoned arguments. Rather, he argued that candidates need first to appeal to voters on values such as fairness, family, and love of country. Once they have the voters' ear on their emotional values, they can go into the specifics of policies regarding health care, education, housing, taxation, and other issues as a means of

applying those values to real life. The victorious presidential campaigns of Bill Clinton in 1992 and 1996, Barack Obama in 2008 and 2012, and Joe Biden in 2020 employed just such a mixture of value-laden appeals with policy specifics.

In other words, in politics as everywhere else, emotion and reason are not opposites but partners that serve complementary functions. Emotion lays out what we wish for and reason lays out the means of achieving our wishes. To use an analogy from my original field of mathematics, emotion provides axioms and reason provides theorems (Levine, 2021, p. 60).

Westen noted that emotional appeals have often been associated with fear mongering from candidates with a dominator outlook (as Donald Trump did egregiously, years after the publication of Westen's book). The temptation many partnership-oriented candidates fall into is to counter fear mongering with sweet reason. Yet he argued, and I agree, that talking only about facts leaves people feeling their lives are meaningless and keeps them open to the appeal of authoritarian demagogues. He added that an emotional appeal to positive moral values works better:

> … emotionally compelling appeals need not be appeals to people's fears and prejudices. They can just as easily be appeals to their hopes and dreams, their sense of shared fate or purpose, their better angels, or their sense that there might be someone who genuinely cares about their welfare and has what it takes to help restore it. (Westen, 2007, p. 44)

Successful appeals to positive, partnership-oriented emotions depend on the language used. Linguist George Lakoff urged political progressives to recapture the framing of many issues that over the years they had inadvertently ceded to the dominator-oriented right wing (Lakoff, 2014). One of Lakoff's examples of framing involved taxation. Conservative candidates frame such measures as the 2017 tax cuts for the top one percent of earners as "tax relief." This language fixes in the hearer's mind the idea of

taxes (on anybody) as a burden or an evil. Instead, he argued, taxes should be reframed not as a burden but as a contribution that allows the provision of social services for the common good: "Taxes are what you pay to be an American, to live in a society that is democratic and offers opportunity, and where there is an infrastructure that has been paid for by previous taxpayers" (Lakoff, in Powell, 2003).

The politics of whipped-up fears only deals with a part of the people it appeals to. The politics of fact sheets and laundry lists also deals only with a part of us. The appeal to values, if *followed* by policies that flesh out those values, appeals to the unified self in each of us.

PARTNERSHIP WITHIN THE SELF

Riane Eisler's book *The Power of Partnership* (Eisler, 2002) outlined the partnership approach to seven levels of relationships in which each of us engages. The first of those relationships is your relationship with yourself. Eisler noted that a partnership relationship with oneself is a foundation for partnership relations with family, friends, coworkers, and the larger society. The relationship with oneself is less obvious than we might think:

> Common sense would say that your relationship with yourself should be one of partnership. Unfortunately, it probably is not.
>
> Many of us treat ourselves less as a partner than as someone to bully and manipulate. We push our bodies around whether they are tired or not. We get mad at ourselves. We criticize ourselves unmercifully. And most of the time we aren't even aware that this kind of treatment is something we learned and don't have to put up with. (Eisler, 2002, p. 1)

Eisler noted that “Health and happiness are a question of balance, and this is exactly what the partnership model leads to” (Eisler, 2002, p. 2). In particular, balance between the intellectual and emotional parts of ourselves is of supreme importance. Imbalance and disharmony between intellect and emotions is widespread in American society, due to the tenacity of traditional, dominator-inspired gender roles in spite of social change (Eisler, 2002, pp. 9-16). Men, being socialized to be rank ordered as superior to women, learn to suppress the part of themselves that expresses emotions of caring, both for themselves and for others. Women receive the complementary socialization to be expressive and supportive to others but not take care of their own needs and not express anger.

The Enlightenment tendency to favor reason over emotion was related to the growth of science and technology and the presumed triumph of empiricism over superstition, which led to advances in social welfare. Yet the Enlightenment was not completely progressive, because it was a movement of white European and American men who did not challenge beliefs in their own superiority to women and to people of color. Rank ordering between reason and emotion within the individual ultimately feeds, and is fed by, rank orderings between social groups:

> Women are often considered more emotional and less rational than men, because bearing children makes them seem “closer to nature.” This professed difference has been used to justify male domination of women as necessary for the continuation of advanced civilization (Lutz, 1988; Shields, 2002, 2007). Likewise, because rapid technological progress came first to white Europeans, people of color are often regarded as more “emotional” … than Caucasians. This belief has been used to justify racial discrimination and white supremacy (Cleaver, 1968/1991; Rattansi, 2007). Finally, homosexuals (male ones at least) are often considered more emotional than heterosexuals, because many are in the arts and because they are thought to be evading parenting responsibilities.

> This belief has been used to justify discrimination on the basis of sexual orientation. (Levine, 2021, pp. 5-6)

By contrast, treating emotion and reason as partners rather than opposites fosters respect for intellectual capabilities and caring capacities in both genders, all ethnic groups, and people of all sexual orientations. It liberates women, people of color, LGBTQ+, and other discriminated groups to use their reasoning powers for their own betterment. At the same time it liberates emotionally repressed white heterosexual men to find and enjoy the natural highs that make life worth living (Eisler, 2002, p. 26).

In psychotherapy there are several emerging theories that have in common the advocacy and encouragement of a unified self that encompasses rational and emotional elements. Richard Schwartz (1995) developed therapeutic methods based on the multiplicity of each person's mind, an idea espoused earlier by Assagioli (1975). The different "parts" of a person can include one part that is childlike and needy, one that is strict and managerial, and one that is indulgent. Yet each person has a "core Self" that is healthier and more integrative. Schwartz's methods involve bringing in parts as needed, treating them as he would a family system, but encouraging the Self to have final control over their actions. Similar ideas run through the dialectical behavioral therapy developed by Marsha Linehan (1993), which combines behavioral science with acceptance and mindfulness. Linehan posited that each of us has an "emotional mind" and a "reasonable mind," and those two minds are synthesized into a "wise mind" which bears some similarity to Schwartz's core Self. A related concept is found in modern treatments of Freudian psychoanalysis, which have a major goal of integrating different aspects of personality including emotions and intellect in the development of a "strong ego" (Ana Maria Aleksandrowicz, personal communication, March 4, 2021).

The multiplicity of the mind is now standard theory in neuroscience and experimental psychology. One of the founders of the modern discipline of psychology, William James

(1890/1981), described the mind as comprising instincts, emotions, and thoughts. James wrote in opposition to other scientists steeped in the rationalist Cartesian outlook who believed that humans had overcome the need for instincts. The work of behavioral neuroscientist Paul MacLean (1990) was instrumental in fitting instincts, emotions, and thoughts into an evolutionary theory of the brain. Levine (2017, 2019) outlined some neural network approaches to quantitative modeling of the interplay between instinct, emotion, and thought.

The prevailing cultural theory that privileges reason over emotion also lumps emotion and instinct together, saying that emotional processes are automatic. Yet the work of James (1890/1981), MacLean (1990), and many other behavioral scientists refutes the conflation of emotion and instinct. MacLean presented much evidence that instinctual processes are common in reptiles, whereas our richness of emotion arose with parental care that is absent in most, though not all, reptiles and present in mammals. Recent brain imaging studies on humans, discussed in the next section, show that the *amygdala*, a key brain area for emotional evaluation, is subject to attentional control (Pessoa et al., 2002; Pessoa et al., 2006). Levine (2017, 2019) discussed the implications of this triune approach to the mind for human decision making. Those articles argued that the complexity of network connections between instinct, emotion, and thought challenge, or at least add nuance to, the fashionable notion that our minds are divided into an automatic, intuitive System 1 and a controlled, deliberative System 2 (Kahneman, 2011).

INTERACTIONS OF EMOTION AND COGNITION IN THE BRAIN

A wide range of connections between emotion and cognition in the human brain are described in Levine (2021, Chapter 2) and reviewed here. These connections, many of which emerged in studies done in the last half century, suggest that emotion and cognition, far from being opposites, depend on one another.

The interconnections within our brains are intricate enough that it is not strictly correct to say that any single brain region is responsible for any single psychological function. Yet each brain region has its own distinct pattern of connectivity with other regions that allows it to play its own distinctive roles in behavior. So when I talk about "the brain region for such and such" it is an oversimplification but a useful one.

The main brain areas involved in feeling and emotional expression are below the brain's outer surface, the cerebral cortex. These areas are the *hypothalamus*, which is at the base of the brain close to endocrine glands, and the amygdala, which is more toward the center of the brain underneath the temporal lobes. The hypothalamus and amygdala receive signals from internal organs such as the heart, endocrine glands, and digestive system. The main brain areas involved in complex cognitive functions are in the cerebral cortex, in the frontal, temporal, and parietal lobes. So how are those two sets of functions connected?

Nauta (1971, 1972) discovered that there is only one region of the cerebral cortex that has connections to and from both the amygdala and hypothalamus. That connecting area is the *orbitofrontal cortex*, a part of the brain's frontal lobes, often known by its acronym OFC. The OFC connects our reasoning not only to emotions, our own and other people's, but to cues from our social environment that signal appropriate behavior. People with damage to the orbitofrontal cortex show a disconnect between their processing of emotional and social cues and their decision making, a disconnect which can take on many forms.

The pathology of detachment between emotion and reason was first noticed in a celebrated 19th century patient, Phineas Gage. Gage was a railroad foreman in Vermont who had an accident in which a tamping iron went through his forehead; a reconstruction of his case by Damasio (1994) pinpointed the OFC as the primary area of damage. He survived the accident with his cognitive abilities intact but with an

overnight change in his personality. Before the accident he had been a sober and responsible individual. After the accident he was impulsive, prone to inappropriate profanity, and could not hold down a job; his friends and family said he was "no longer Gage." Yet in other people the effect of OFC damage takes on the opposite form of being overly deliberate. A patient of Damasio's who was damaged in that brain area, known by his initials E. V. R., obsessed endlessly one night about which of several restaurants to eat at (Damasio, 1994). He even drove to the restaurants to see if it would help him make up his mind and it didn't. Without emotional meaning linked to his body, E. V. R. found it hard to prefer one course of action over another.

Damasio (1994) developed the idea of *somatic markers*, which are the feelings we get in our body that precede our decisions and move us to choose one course of action over another. He noted that patients with damage to the amygdala or the OFC lack normal somatic markers. Patients with amygdalar damage lack these visceral guidelines entirely. Patients with OFC damage, on the other hand, can react viscerally to significant events such as pain after they happen but cannot have, or act on, "gut feelings" about possible events before they happen (Bechara et al., 1999).

OFC-damaged patients have problems with planning behavior because the OFC provides the link between emotion and thought that enables us to act appropriately in the real world. Part of this link is via the neural pathways between the OFC and amygdala (Schoenbaum et al., 2003). The OFC connects via the amygdala to the hypothalamus and autonomic nervous system, which are the brain's gateways to the heart, stomach, intestines, skin, and endocrine system (Ghasghaei & Barbas, 2002). Since the OFC is also connected to brain representations of sensory events and concepts, the links between OFC and amygdala enable events and concepts to take on emotional meaning.

In the mid-1990s Damasio and his colleague Antoine Bechara invented a game called the *Iowa Gambling Task* in order to simulate human decision making in their laboratory (Bechara et al., 1994). In this task the subject undergoes a sequence of trials whereby

he or she must draw a card from one of four decks of cards shown on a computer screen, and each deck yields different gains and losses of play money. Two of these decks look good at the start but turn out to be high-risk. Those decks yield higher short-term payoffs than the other two, but also lead on the average to long-term losses. The other two decks start out with lower short-term payoffs but lead on the average to long-term gains.

The Iowa Gambling Task has been used to compare the decision processes in patients with damage to either the OFC or amygdala and in subjects without brain damage. Bechara, Damasio, and their colleagues found that subjects without brain damage begin with selections from one of the risky decks, but gradually begin to shift towards safe decks as the task progresses. Patients with damage to either the OFC or amygdala never learn the safe strategy and stick with the risky decks.

All these data show that processing emotionally and socially important events, and using them in making decisions, depends on the interplay between a region on the outer surface of the brain (the OFC) and another region below the surface (the amygdala). In other words, both "advanced" and "primitive" parts of the brain are required to make decisions that are effective responses to a complex environment. As neural network pioneer Stephen Grossberg put it, both emotion and reason are essential to "how an intelligent being can *autonomously adapt to a changing world*" (Grossberg, 2016, author's emphasis).

Neuroscientist Luiz Pessoa gave evidence that no part of the brain should be considered exclusively "cognitive" or exclusively "emotional" (Pessoa, 2008, 2013). For example, while the OFC is considered an "emotional" area because of its role in processing emotional inputs, another part of the frontal lobes, the *dorsolateral prefrontal cortex* (DLPFC), is considered "cognitive" because of its importance in applying working memory to intellectual tasks (Miller & Cohen, 2001). Yet the DLPFC is also involved in

processing related to emotion. Single neurons in the DLPFC of monkeys are active in response to visual cues that predict the monkey will get a food or drink reward (Watanabe, 1990, 1996). Some of these neurons react more strongly to a preferred food than to a less preferred food, or more strongly to a larger than a smaller reward.

Likewise, the amygdala, which is considered "emotional," is important for performance of cognitive functions that involve significant events. Anderson and Phelps (2001) showed that the amygdala is required for selective attention to emotionally negative words. These researchers studied a phenomenon called *attentional blink*, whereby if subjects are asked to respond to one specific stimulus (e.g., a word) and then given a second target stimulus less than a second later, their processing of the first target interferes with response to the second target. For normal subjects, the attentional blink was small if the second stimulus was an emotionally negative word such as "rape." However, patients with damage to the amygdala did not show reduced attentional blink to negative words. The amygdala is also involved in positive emotions. It responds selectively to inputs that are relevant for current goals, such as an emotionally neutral face that might be socially important, and is required to learn conditioned responses relating to eating (Sander et al., 2003).

The work of Luiz Pessoa's laboratory (Lim et al., 2009; Pessoa et al., 2006; Pessoa et al., 2002) shows that emotion is subject to attentional control and is not always automatic. These researchers used *functional magnetic resonance imaging* (fMRI), a tool that maps blood flow in specific brain regions while one is performing a cognitive or behavioral task. Pessoa and colleagues studied fMRIs of subjects looking at visual displays with faces in the center. The faces were either fearful, happy, or emotionally neutral, and there were also pairs of colored oriented (nearly horizontal or nearly vertical) bars above the faces. The subjects were sometimes cued to attend to the face by being asked whether the face was male or female. At other times they were cued to attend to the bars by being asked whether the bars were of the same or different orientations. The experimenters found that the amygdala responded more to emotional

faces than to neutral faces, as befits an emotional processing region. Yet more surprisingly, for each type of face, amygdalar activation was much larger when subjects were attending to the face than when they were attending to the bar.

Other neuroscientists had found results suggesting that the amygdala is not subject to attention control, that it runs almost on automatic pilot. Yet Pessoa's laboratory found more evidence against that conclusion. Attentional distraction from a complex task can reduce the amygdala's responses to stimuli that have previously been paired with electric shock. Also, amygdalar responses to a fearful face are weaker when the subject thinks of the face as less fearful. Other researchers (Ochsner & Gross, 2003) found that people can sometimes consciously control how much fear they feel about a face, and conscious control inhibits the amygdala's response.

In addition, sometimes the adversary of reason is not emotion but instinct or automatic behavior. An example is compulsive drug addiction. A neural mechanism involving the chemical transmitter substance called dopamine may explain why addicts keep on taking drugs long after their pleasure from the drugs has worn off.

Dopamine has gained attention in the popular press for being associated with rewards. Cocaine, amphetamine, caffeine, and many other addictive drugs act by increasing the amount of circulating dopamine in reward-related regions of the brain. Also, dopamine-producing neurons in the midbrain of monkeys become electrically active when the monkeys unexpectedly receive a food reward like fruit juice (Schultz et al., 1994).

Yet neuroscientists Kent Berridge and Terry Robinson found evidence that dopamine's role has little to do with emotional pleasure and more to do with automatically generating reward-seeking behavior (Berridge & Robinson, 1998). These authors gave rats chemicals that reduced dopamine levels and examined resulting changes in the rats' behavior. They found that rats with lowered dopamine levels showed normal

pleasure reactions from sweet-tasting food – paw licking and tongue protrusions. But these same rats showed less than normal approach both to food and to objects that had been paired with food. These researchers concluded that dopamine reward signals are not related to enjoyment, which they called "liking." Rather, dopamine strengthens what they called “wanting,” that is, motivation to work for the reward, regardless of any feelings about it. Feelings of pleasure seem to involve different parts of the brain, namely, the amygdala and the opioid systems.

This disconnect between wanting and liking also explains why drug addicts can continue to crave the drug even after their pleasure from the drug high is much less than it was when first taken (Robinson & Berridge, 2001). Holden (2001) suggested, without conclusive proof, that a similar mechanism could underlie behavioral addictions such as addictions to overwork, shopping, gambling, or pornography.

More speculatively, could an analogous addiction mechanism also account for some people’s continuing to stay in abusive relationships, or their persistent attraction to toxic leadership and dominator interactions? Much evidence exists that partnership interactions promote optimal brain function more than do dominator interactions (Eisler & Levine, 2002; Levine, 2015,2021). Yet the persistent abuse of dominator interactions might hijack the brain’s dopamine pathways and make the replenishment of dopamine dependent on further abuse. This suggests that getting domination “addicts,” including conspiracy theory believers and followers of demagogues, to change their behavior requires giving them more healthy substitute sources of dopamine replenishment; in other words, natural highs as described by Eisler (2002, p. 26).

Finally, we can draw some lessons about our species from comparing human brains with those of other primates (Kaas, 2013). Our brains are about five times larger than those of great apes (chimpanzees, bonobos, gorillas, and orangutans) but three key areas of brain are proportionately larger in humans. One area that is outsized in humans is the

prefrontal cortex, the forward part of the frontal lobes. The prefrontal cortex is the part of the brain most involved in planning, decision making, and complex behavioral control. Yet it also includes the OFC which specializes in processing social and emotional inputs: inputs from the outside world about what is friendly or hostile and from our internal organs ("gut feelings") (Damasio, 1994; Nauta, 1971). A second area that has grown in evolution is the *posterior parietal* cortex (parietal being toward the top of the head), which is involved in space perception and in making and using tools. The third is the *insula*, which is one of the evolutionarily oldest parts of the cortex and far removed from the brain surface. The insula has attracted interest in recent years for its involvement in empathy and in deep feelings (Craig, 2002; Keysers et al., 2010).

In summary, evolution tells us that, "… compared with other primates, and even more with other mammals, we have expanded mental ability *both* in reasoning and in emotion. In other words, we are 'more rational' than other animals but also more 'emotional' than other animals!" (Levine, 2001, pp. 17-18). Cognition and emotion are ultimately inseparable, because cognitive processes include attributing positive or negative emotional values to events, stimuli, and potential actions. Further evidence of this tight connection comes from behavioral studies.

Interactions of Emotion and Cognition in Behavior

If you have witnessed a severely injured person, it will stay in your mind more than a random encounter with an average person. Likewise, a breathtakingly beautiful mountain vista will stay in your mind more than an average walk through your neighborhood.

These examples from life tell us intuitively that emotional stimuli have an advantage over non-emotional stimuli in the competition for storage in working memory. A range of experimental results, with diverse methods of physiological and behavioral measurement, broadly supports the notion that processing of emotional stimuli is both

more vivid and more accurate than processing of non-emotional stimuli (Talmi, 2013; Todd et al., 2012). The memory advantage is more clear-cut for stimuli or events with negative emotional importance, because those events threaten the achievement of our goals, if not our survival (Talmi, 2013). The memory advantage for positive events is more prominent in older adults (those over 60 years of age) than in younger adults (Joubert et al., 2018; Mather & Carstensen, 2005). This emotional "positivity effect" is strongest in those older people with the best cognitive control, which speaks to the interconnection between emotion and cognition.

Just as emotion is woven into the very fabric of cognition, the reverse is also true: cognition is woven into the very fabric of emotion. Several psychologists in the 19th and 20th centuries sought purely physiological explanations for the basic emotions (happiness, sadness, anger, fear, disgust, and surprise). Yet the mapping of emotions to bodily states proved to be more ambiguous than expected. In the 1960s several cognitive psychologists found results suggesting that for the full experience of emotion, bodily arousal needs to be accompanied by cognitive appraisal (Lazarus, 1968; Schacter & Singer, 1962; Valins, 1966). For example, Richard Lazarus and his colleagues showed the same gruesome film (one about the painful practice of subincision of adolescent boys in an Australian tribe) to two groups of experimental participants with different accompanying soundtracks (Lazarus, 1968; Speisman et al., 1964). One group of participants were constantly reminded of the harmful or painful consequences of the subincision events in the film, while another group were induced to feel an intellectual detachment toward those events. The participants who heard the soundtrack about harmful consequences felt more stressed by the film than the ones who heard the detached soundtrack, as measured physiologically by skin conductance responses and behaviorally by self-reported moods.

Yet not all psychologists have accepted Lazarus' view that cognition is important to emotion. Robert Zajonc (1980, 1984) argued instead that humans share basic emotions with other animals and, like other animals, react too quickly to emotional stimuli for

cognitive processes to be involved: an example being a rabbit reacting to a snake. Zajonc argued further that emotions must come before cognition because emotions are inescapable; that is, one can control the expression of an emotion but cannot control the feeling itself. Moreover, emotions are hard to put into words. In response, Lazarus (1999) argued that even if emotions are outside the control of the conscious mind, they carry within them a meaning; that is, "emotion also includes within it the thoughts and goals that aroused it in the first place" (p. 9). Current psychologists have found a middle ground between the 1980s positions of Zajonc and Lazarus, viewing emotions as primary and universal evolutionary adaptations but also strongly influenced by our understanding of our environments, other people, and ourselves (Kappas, 2006; Robinson et al., 2013).

The conventional wisdom of Western culture is that emotion clouds judgment and distracts people from the dispassionate consideration of alternatives that is necessary to make the best decisions. The findings of Damasio (1994) about patients with damaged emotional-cognitive brain pathways refute that conventional wisdom by showing that emotion is necessary for good decisions. Moreover, both positive and negative emotions have been shown to have value for cognitive functions, for different reasons.

While someone who is madly in love or has just won the lottery may be clouded in their judgments, the work of Alice Isen and colleagues shows that milder forms of happy emotions are good for creativity on a range of problems. These researchers induced positive emotions in their experimental participants in several ways: showing five minutes of a comedy film, passing out a small bag of candy, and mentioning words that have pleasant meanings (Isen et al., 1970; Isen, 1993). They found that participants in a positive mood were better than those in a neutral mood at tasks that required unconventional solutions – including one task that involved mechanical creativity and another that involved unusual word associations. Isen and her colleagues also found that participants with induced positive emotions made more flexible categorizations

than participants in other moods. If a category was a favorable one, participants with induced positive emotions were more likely than others to identify atypical members as part of the category. For example, participants in a positive mood who were asked to identify which people were included in the category of nurturers were more likely to include bartenders.

Negative emotions have different beneficial effects on our cognitive functions. When we are feeling sad, for example, we are motivated to improve our situation, which can increase the care with which we process information (Forgas, 2013). For example, experimental subjects witnessed a staged confrontation and then a week later were asked questions containing misleading information about that confrontation while in either a happy or sad mood. The subjects' memories of the incident were more accurate and less likely to be influenced by the false information if they received the information in a sad mood.

Behavioral scientists regard emotions as evolutionary adaptations that provide mammals with advantages for survival or reproduction or both. Plutchik and Kellerman (1980) traced functional roles for six emotions that most scientists regard as basic. The functions Plutchik and Kellerman attribute to these emotions are: for happiness, preserving successful behavior patterns and relationships; for sadness, promoting reattachment after losses; for fear, protection against threat; for anger, destruction of obstacles toward attaining goals; for disgust, rejection of potentially harmful objects; and for surprise, orientation to novel situations.

The importance of emotion for cognition was also shown by results on the negative effects of absent emotional attachment in both juvenile monkeys and human children, even when adequately fed and sheltered. Harlow (1958) noted that the attachment of monkeys to their mothers is lifelong, outlasting their dependence on the mother for food. To investigate their needs, he and his colleagues separated baby monkeys from their mothers at birth and put them in individual cages. Each cage was attached to a

separate cage containing two surrogate mothers, one of wire and the other of soft terrycloth. Half of the monkeys received their nourishment (a bottle of milk) from the wire mother and half from the cloth mother. Regardless of which "mother" gave them milk, the monkeys spent much more time with the cloth mother. Also, the monkeys would go to the cloth mother whenever they were anxious: the soft contact gave them security. This result showed that in developing animals, the mother's role of providing physical comfort and bodily stimulation is at least as important as her role of providing food and shelter.

Despite the security that the cloth mother gave Harlow's infant monkeys, it was a poor substitute for a real mother in the long run (Harlow & Harlow, 1962, 1966). Monkeys removed from their mothers did not develop normally into adults; neither did monkeys deprived of contact with other monkeys in their own age group. Monkeys isolated after birth for six months or more tended to stare fixedly into space, be excessively afraid of other monkeys, and not develop normal social interactions or sexual relationships.

Difficulties in adjustment and in cognitive function have also been found in orphaned human children. One source of orphan children adopted by Western parents was Rumania under the Ceausescu dictatorship of the 1980s. Rumanian orphans had been warehoused in mass facilities that gave them adequate food and shelter but deprived them of sensory stimulation and human contact. After adoption, Rumanian children who had been in an orphanage for more than a year tended to score lower than home-reared children on IQ and other intellectual tests (MacLean, 2003). These children also were more likely to develop behavioral problems such as distractibility, acting out, and indiscriminate friendliness. The intellectual and behavioral deficits of orphanage children were accompanied by brain abnormalities (Chugani et al., 2001). Reduced metabolism was found in key parts of the brain such as prefrontal cortex, amygdala, and hippocampus.

Institutionalization, or neglect by parents, can lead to abnormalities in other bodily organs, such as endocrine glands. Children raised without adult care often exhibit abnormally low height and weight, a condition that scientists Robert Patton and Lytt Gardner called *deprivation dwarfism* (Gardner, 1972; Patton & Gardner, 1963). Deprivation dwarfism seems to be explained by abnormal sleep patterns that inhibit the secretion of growth hormone by the pituitary gland, the gland that is closest and most connected to the brain. Patton and Gardner speculated this could be a cause of the high death rates of children in orphanages and foundling homes over the last three centuries.

The brain's plasticity, which has only been established since the 1960s, means that the quality and quantity of adult care children receive is vital to their emotional, social, and cognitive development as adults (see Eisler, 2014, or Eisler & Fry, 2019, for a review and policy implications). Child care needs to both on an emotional level with love, play, and stimulation, and on a cognitive level with encouragement of mental activity.

THE NEED FOR A WORLD-WIDE COMPASSIONATE REVOLUTION

At a time when the world is undergoing multiple crises – climate change, dizzying technological growth, and forced cultural confrontations, aggravated by a pandemic – many people all over the world are hoping merely to survive. Visions for the improvement of society seem out of place to many. Yet these very crises provide us an opportunity to rethink not only our social policies but our basic cultural mores.

The late population ecologist John Calhoun explained revolutions of consciousness in human history as responses to the stresses caused by rising world population (Calhoun, 1971, 1974, 1984). Calhoun proposed that we have dealt with increasing world population throughout history by changing the rules governing what types of interactions were allowed or encouraged. He fit approximate peak dates for the agricultural, religious, artistic, and scientific revolutions to critical dates for the rise in

the world's population. Specifically, the world's population at the date when he placed a revolution in thought was about four times its population at the date of the previous revolution. Projecting into the near future from when he wrote, he foresaw a communications revolution peaking around 1988.

Calhoun's description of the Communications Revolution anticipated many of the recent technology advances that impact our lives. He foresaw how our lives would change, despite dying in 1995 before the growth of the Internet, smart phones, social media, and widespread automation of routine jobs. Calhoun also foresaw that the rapid growth of technology would lead to social disruptions. People would be thrown into contact with a wider range of other people across the world, and the old rules which worked well in isolated communities would work less well in global communities. Indeed, the growth of technology has happened much more quickly than the evolution of our strategies for coping with it.

With world population now growing at the fastest rate in human history, Calhoun predicted *another* revolution peaking between 2018 and 2030. If we act unwisely as a species, he added, this future revolution might entail ecological disaster, with population outstripping diminishing resources. Or it might lead to world-wide authoritarian rule and cultural sameness. But if we act wisely, it can instead bring about a much more desirable scenario, which he labeled the *Compassionate Revolution*.

The Compassionate Revolution would create societies oriented toward fulfillment of human potential and not merely toward survival. It means we would respond to the complexity of society by acting with greater trust of others, including others who differ from us in race, gender, religion, or cultural beliefs ((Calhoun, 1971; Friedman, 2006). Calhoun described the transition process from the Communications to the Compassionate Revolution as follows:

> … the present era of radical change will become intensified as the character of roles needed to meet new functions also change. Thus, in the presence of increased exposure to value conflict, there will be required an augmented awareness of the necessity of others to maintain value sets differing from one's own. Furthermore, realizing one's own functional role requires expenditure of considerable effort in assisting others to fulfill the objectives of their value sets. It is this awareness, and participation in, the realization of values held by others which characterizes the compassionate perspective. This perspective also includes an awareness that many individuals will have trouble in developing and altering their roles and value sets in accordance with the demands of an overall system which is changing and becoming more complex. Holding to this perspective further requires marked attention to assisting others, whom we ourselves might earlier have been, to recoup from this hopefully temporary derailment. (Calhoun, 1971, p. 374).

In order to bring about the Compassionate Revolution, our goal must be to make every human being actively concerned about every other human being and the rest of the planet. Active concern has the cognitive aspect of understanding where other people come from, including people whose cultural assumptions are different from our own. It also has the emotional aspect of investment in the welfare of others, not just those who are members of whatever groups we belong to.

Levine (2021) reviews the literature on cognitive and emotional aspects of empathy. The strongest part of emotional empathy is what is called *contagion*: internally taking on someone else's feelings, becoming sad, angry, fearful, disgusted, or happy when the other person is. Contagion is more likely to happen when we are dealing with someone close to us (a family member or close friend) or someone who is similar to us. Cognitive empathy consists of what is called *perspective taking*: understanding another person's outlook or situation, and looking at their actions from their point of view. In between contagion and perspective taking is understanding what another person is feeling, which

is a key part of social competence. Cognitive empathy is effortful when one is trying to understand someone who is very dissimilar to oneself.

Cognitive and emotional aspects of empathy seem to involve different brain regions, with possible overlap in the insula (Fan et al., 2010). The insula is an evolutionarily old and somewhat buried region of the cerebral cortex, but is proportionately larger in humans than other primates (Kaas, 2013). Thus the insula seems to be a particularly important area for emotional-cognitive integration.

The Compassionate Revolution will require both the relatively easy contagion with those we are close to and the more effortful perspective taken with those who are more distant from us. Both types of empathy will need to be in our consciousness when we examine government policies and day-to-day interpersonal interactions, in the family, workplace, and elsewhere. The stresses produced by technological growth, that is, by what Calhoun called the Communications Revolution, demand that we reexamine social norms rooted in earlier ages and more parochial communities. They are norms we have unconsciously integrated, based on in-groups and out-groups, winners and losers, and requirements for people to prove that they do not pose a threat to society. It is the increase in these stresses which is driving people in the United States and elsewhere toward authoritarian leadership that promises solutions but really aggravates the problems. In my country the stresses are driving polarization of opinions and beliefs, some of the beliefs wildly at variance with the truth (Oliver, 2020).

In other words, many of us unconsciously deal with rapid perplexing change using the dominator model. Yet it is the partnership model, including partnership between each of our own minds and our hearts, that will enable us to reap the benefits of the modern technologies without losing our humanity.

Implications of the Compassionate Revolution in different domains of life are discussed in Levine (2015; 2018; 2021) and summarized here. All of these implications are based on some key organizing principles that differentiate a partnership society from a dominator society. The principles include trust without exclusiveness; community without conformity; and delight without indulgence.

In religion, the Compassionate Revolution will mean a quest for meaning and community from spiritual transcendence that relies on the individual's inner experience and intuition rather than on outside supernatural authority; in fact, it exhorts people to search for truth wherever they find it. In psychotherapy, it will mean fostering individual freedom, self-acceptance, intuition, and living in the present but integrating those qualities with concern for other people's welfare and respect for the intellect. In politics it will synthesize the liberal notion of activist government seeking to promote average people's welfare with the conservative notion of supporting enduring values and communities. In economics it will put a positive value on the contributions of caretaking professions and promote supportive working conditions at all levels (Eisler, 2007). In the family it will replace the patriarchal rule of the father with equality between all adults of all genders, and treat sexuality as a source of pleasure and bonding if mutual trust is preserved.

Implementation of these principles will require us to look beyond "the way things have always been" (Eisler, 2002) in our day-to-day lives. In particular, in all these domains of life we can no longer act on reason *or* emotion: we need both. We need to live by the emotional values of mutual caring and concern while we are rational about the interactions and policies that embody those values.

CONCLUSION

The current state of the world is making increasing numbers of people anxious, in both rich and poor countries. Many things that we have relied on are no longer seen as

dependable. Our democracy is under threat from authoritarianism, our weather from climate change, and our health from current and possible future pandemics. Anxiety leads people to focus on their own unmet emotional needs.

A narrow emotional focus can lead to rejection of reason and of scientific argument. Science denial, aggravated by widespread science illiteracy, was a major factor in the United States' dismal early response to the COVID-19 pandemic (Miller, 2020). As Miller (2020) says, "Rather than engaging with information that is difficult to 'see' and that may require changes in behavior, it may be easier to take in data that are simple and reassuring" (p. 2256). Intuition combined with raw emotion is contributing also to the appeal (to about 20 percent of the American public) for political conspiracy theories (Oliver, 2020).

In these tough times, convincing a large segment of the population to reject untruth is necessary for a partnership society but difficult to achieve. There is a widespread distrust of science, ranging from evolution to vaccination (Achenbach, 2015), a distrust based either on traditional religion or a vague sense that science is hostile to the human spirit. Yet there is a wealth of evidence that the exact opposite is really true (Eisler & Fry, 2019; Levine, 2021). Our emotional and spiritual needs are best met by thoughtful examination of the evidence from nature about how to meet those needs. This is why the mind and the heart need to be partners, not antagonists, in everything we do, at both the individual and societal levels.

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